

ORNITHOLOGY.—*Geographical variation in the American redstart (Setophaga ruticilla)*.¹ ALEXANDER WETMORE, Smithsonian Institution.

Division of the common and widely ranging American redstart, *Setophaga ruticilla* (Linnaeus), was first proposed by Oberholser,² who separated the birds of northwestern Canada, stating that "this western race differs from the eastern form in smaller size, smaller orange or yellow wing-spot; in the female also in paler, more grayish, less conspicuously olivaceous, upper surface." After a careful study of material available in the National Museum in 1939, the writer, however, came to the conclusion³ that the suggested characters did not hold, and so regarded the species as indivisible. Recently Burleigh and Peters,⁴ after examination of specimens from Newfoundland, conclude that there is a northern race extending across Canada that is different from the birds of southern range.

Though the collection of redstarts in the National Museum in 1939 when I first examined this problem was extensive, most of the breeding specimens from the south had been collected in the month of May. It is well known now that with species like the present one, with a considerable population that nests in the forests of northern Canada, spring migration of the northern group may be delayed later than was formerly understood, so that during May many individuals are still enroute to their northern breeding grounds. As a few casual examples relating to the species here under discussion, I have record of personal observation of redstarts near Nazaret, on the Guajira Peninsula, northeastern Colombia, on April 30, 1941, and of specimens taken at Escorial, Mérida, Venezuela, April 30, 1903, near Port-au-Prince, Haiti, May 9 and 10, 1866, in Petén, northern Guatemala, May 3, 1923, and on Amelia Island, Florida, May 10, 1905. There are so many of these reports that they

can not refer to casual individuals that for some reason would not migrate, but rather it is apparent that they are birds that would nest in the far north where their nesting grounds are not open to them because of cold until the end of May. They are therefore in passage through the United States when their southern representatives are on their nesting grounds. Collections made in the month of May thus may contain a mixture of northern and southern individuals. This has led to confusion in attempts to separate a northern form.

To examine the matter of geographic variation I have selected from our large series the adult birds collected in June and July, when all were certainly on their breeding grounds. Much material taken in these two months has been added in recent years, especially from collections made by Burleigh in Mississippi and Georgia, and by Burleigh and Peters in Newfoundland, Nova Scotia, and New Brunswick, with numerous others from other sources. First comparisons were made entirely with this series, which included 69 adult males, 50 adult females, and 27 breeding males still in immature dress, covering the area from Louisiana and Georgia to Mackenzie and Newfoundland. These findings were checked subsequently with the considerable series of redstarts in the American Museum of Natural History, which I have examined through the courtesy of the Department of Birds of that institution.

It may be said at once that adult males from the far north and the far south, and from eastern and western localities, may not be distinguished with certainty on any character, or combination of characters. My first opinion, made in 1939, on a much smaller series of males thus still holds. Size, within the usual limits of individual variation, is identical in the various areas. This is easily illustrated by the following figures on wing length taken from birds (all males) collected in June and early in July, when they were on their breeding grounds:

¹ Received February 16, 1949.

² Louisiana Dept. Cons. Bull. 28: 572-573. 1938.

³ Proc. U. S. Nat. Mus. 88: 561-562. 1940.

⁴ Proc. Biol. Soc. Washington 61: 121. 1948.

		<i>Mm.</i>
14	from Alberta and Mackenzie.....	61.5-65.6
11	from Newfoundland.....	64.6-67.9
7	from Nova Scotia and New Brunswick.....	63.0-66.3
5	from Montana, Washington, and British Columbia.....	62.9-64.4
18	from Maryland, Pennsylvania, and Kentucky.....	62.2-67.3
8	from Georgia and Mississippi....	62.3-66.5

The other usual measurements of length of tail, culmen from base, and tarsus show equal agreement.

The other principal difference that has been proposed to separate adult males is that of the size of the orange-colored spot on the wing. This is formed by orange markings that extend on the outer webs of part of the remiges from the base for an area of varying length toward the tip. This marking is always present on the secondaries but varies in extent on the primaries. In some it is found on all the primaries, while in others it is absent on these feathers except for a very faint indication at the extreme base. The basal section is concealed by the overlying coverts, the apparent extent of this coverage on the secondaries in museum skins depending in some specimens on disarrangement of the feathers, where the preparator has stripped the quills of the secondaries loose from their proper attachment on the ulna (a pernicious and unnecessary procedure that may lead to uncertainty or error in study of the relation of relative length of the feathers or of their markings). The size of the spot may be judged best by examining its extension across the primaries, and by the distance from its posterior margin to the distal tips of the longest primaries. The series at hand shows birds with small wing spots and large wing spots throughout the entire range of the species. There seems to be a tendency for more birds to have a reduced wing spot in the north, but this is not fixed, as birds with large spots and small wing spots are found indiscriminately from Mississippi and Georgia to northern Canada. Adult males, therefore, may not be separated geographically on any trenchant characters.

On examination of the excellent series of females now available it is found that those from the north are slightly darker gray

above, while those from the south are faintly lighter gray and slightly more greenish. This distinction is evident also in males in immature dress that resemble the female, though in these the size of the wing spot is variable as in adults. The darker color of northern birds is slightly emphasized in immature males and females in fresh fall plumage. In this stage the northern specimens, while greenish on the back, are less so than birds from the southern sections.

Müller's description of *Motacilla tricolora*, which reads "oben ist sie schwarz, unten weiss, in den Seiten und an der Wurzel der Ruderfedern gelb, auch haben die Flügel fünf gelbe Flecken," refers to an adult male bird and thus might be either of the two subspecies here under discussion. Oberholser, however, as first reviser, has allocated the name to the northern race, an action that must be recognized under our rules of nomenclature.

In the two forms here recognized the northern one nests in general through the northern part of the Canadian Zone, and the southern one through the Transition and Austroriparian Life Zones, extending north into part of the southern area of the Canadian Zone. The two will stand as follows:

Setophaga ruticilla ruticilla (Linnaeus):
Southern Redstart

Motacilla Ruticilla Linnaeus, Syst. Nat., ed. 10,
1: 186. 1758. (Virginia.)

Females and immature males somewhat lighter gray above, washed with somewhat brighter green on the back; adult males not separable.

Breeds from Minnesota, Wisconsin, Michigan, southern Ontario (Hamilton), New York, Vermont (Newfane), New Hampshire (Hollis), and southern Maine (Big Lake in Washington County, Andover, Auburn, Eliot) south to southeastern Louisiana, central Mississippi, central Alabama, and central Georgia.

Recorded in migration and winter to southern Texas (San Antonio, Pecos City, Lomita, Brownsville), the Gulf coast of Louisiana, Mississippi, and Alabama, Florida, British Honduras (El Cayo), Guatemala (Panajachel, Chixoxan, Finca Chama, Alto Vera Paz), Costa Rica (Angostura, Naranjo), Panamá (Boquerón, Boquete in Chiriquí, San José Island, and Mount Tacarcuna,

Darién), Bahama Islands (New Providence), Cuba (Mariel, Guamá, Monte Verde), Jamaica (Trelawney, St. Andrews, Falmouth, Spanish Town), Haiti (Gonave Island, Port-au-Prince, Petites Cayenites), Dominican Republic (Azua, Sánchez), Puerto Rico (Mayagüez, Anegado Lagoon, Río Piedras, Mameyes), Culebra Island, St. Thomas, St. John, Saba, St. Vincent, St. Lucia, Antigua, Sombrero, Barbuda, Montserrat, Guadeloupe, Dominica, Trinidad, Colombia (many records), throughout Ecuador (Ibarra, Zamora, Mindo, Esmeraldas, Papallacta), and Venezuela (south to Roraima and Auyan-tepui); casual in Baja California (Miraflores).

Setophaga ruticilla tricolora (Müller): Northern Redstart

Motacilla tricolora Müller, Vollst. Natur.-Syst. Suppl. Reg. Band: 175. 1776. ("Cayenne.")

Females and immature males somewhat darker above, washed with duller green in immature dress; adult males not separable.

Breeds from Yukon, Mackenzie (mouth of Nahanni River, Fort Simpson), and northern Alberta (Athabaska Delta, Fort Chipewyan, Slave River, Moose Factory) south through British Columbia (east of the Coast and Cascade Ranges) to west-central Washington (Winthrop), Idaho, northern Utah, and Montana (Terry, Darnalls, Fort Keogh), eastward through Alberta, Saskatchewan, central Ontario, and Quebec to Newfoundland, northern Maine, New Brunswick, and Nova Scotia (North Sydney, Wolfville).

Recorded in migration and winter in Oregon (McEwen, Ironside), Wyoming (Fort Steele, Douglas), North Dakota (Cannonball, Goodall, Dawson), Nebraska (Valentine), Arizona (Paradise, San Bernardino Ranch), Minnesota (Fort Snelling), Michigan (St. James, Ann Arbor), Illinois (Mount Carmel), Indiana (Wheatland), Arkansas (Winslow), Tennessee (Hornbeak, Crossville), New York (Montauk Light, Shelter Island, Jamaica, Parkville, Cold Spring), New Jersey (Franklin, West Orange, Morristown), Maryland (Chesapeake Beach, Laurel, Kensington), District of Columbia, Virginia (Four Mile Run, Ballston, Falls Church, Campbell County), North Carolina (Reidsville, Pisgah National Forest, Mount Mitchell), Georgia (Stone Mountain Athens, Decatur, Lawrenceville), Texas,

(San Antonio, Point Bolivar, Point Isabel, Brownsville), Louisiana (Baton Rouge, Woolmarket, New Orleans), Mississippi (Gulfport, Deer Island, Ship Island), Alabama (Teasley's Mill), Florida (Amelia Island, Gainesville, Dry Tortugas), Veracruz (Tres Zapotes), Yucatán, (Gaumer specimen, probably from Mérida), Puebla (Metlaltoyuca), Tabasco (Teapa); British Honduras (El Cayo, Belize); Guatemala (La Libertad, Petén, Livingston, Progreso, Finca Chama, Secanquim); Honduras (San Pedro Sula), Costa Rica (Volcán Turrialba, Angostura); Panamá (Boqueté); Bahama Islands (Green Cay); Cuba (Mariel, Guamá, Doce Leguas, Puerto Gibara); Swan Island; Jamaica (Salt Ponds, Falmouth); Haiti (St. Michel, Cerca-La-Source, Morne La Hotte, Gonave Island, Île à Vache); Dominican Republic (Moca, Espaillet, Los Cabuyos, Constanza, Ciudad Trujillo, Sánchez); Puerto Rico (Mayagüez, Caguas, Fajardo); St. Thomas; Tortola; Antigua; Dominica; Guadeloupe; Colombia (Bonda, Las Nubes, Onaca, Valparaiso, Cali, Virolín, Maicao); Ecuador (Papallacta); Venezuela (Escorial, Nevado, El Valle, Colonia Továr, Mount Guacharo, Caicara, Mount Auyan-tepui, Cerro Yapacana); Brazil (Serra Imeri, near Salto do Hua).

The two forms apparently migrate and winter together. In the United States in migration they cover the region east of the Rocky Mountains, with occasional stragglers at more western localities. The flight extends through both Central America and the West Indies to northern South America, where the birds are most common in hilly and mountainous areas. While the two range together the northern race is evidently less numerous in individuals, a fact explained by the much smaller breeding area that it occupies.

The specimen reported from Serra Imeri, Brazil, taken December 7, 1930, by E. G. Holt, while on an expedition for the National Geographic Society is one of three records of the redstart from that country. The others are based on a bird taken January 24, 1939, on the upper Rio Cotinga, and on one from the mountain range called Serra Tapirapeç or Curupira in April 1946. These two, recorded by Phelps and Phelps,⁵ have not yet been identified to subspecies.

⁵ Bol. Soc. Ven. Cienc. Nat. 11: 71. 1947.